ABSTRACT

In the present study, a response surface methodology (RSM) was used to investigate the effects of independent variables, their simultaneous interactions and quadratic effects on Cd(II) adsorption onto peanut hull-methyl methacrylate (PH-g-MMA) biopolymer. The biopolymer was fabricated through radical polymerisation using benzoyl peroxide (BPO) initiator in the presence or absence of aluminium triflate ($Al(OTf)_3$) as cocatalyst to evaluate the effect of the cocatalyst on adsorption capacity of the adsorbent. The optimum adsorption conditions were pH 6.5, contact time 63.75 min, dosage 0.2250 g, initial concentration 76.25 mg/L in the presence of a cocatalyst and pH 5.7, contact time 63.75 min, dosage 0.2250 g, initial concentration 76.25 mg/L in the absence of a cocatalyst. The model adequacy and validity were confirmed by performing additional experiments under the proposed optimum conditions. The Cd(II) adsorption process best fitted pseudo-second-order kinetic which suggested that the process was controlled by the chemisorption mechanism. The adsorption process was also in accordance with the Langmuir isotherm model with maximum adsorption capacities of 65.80 mg/g and 46.9 mg/g in the presence or absence of cocatalyst, respectively. Consequently, the study demonstrated the cocatalyst enhanced the adsorption properties of the adsorbent and that RSM is suitable for optimising experimental conditions for Cd(II) adsorption capacity.